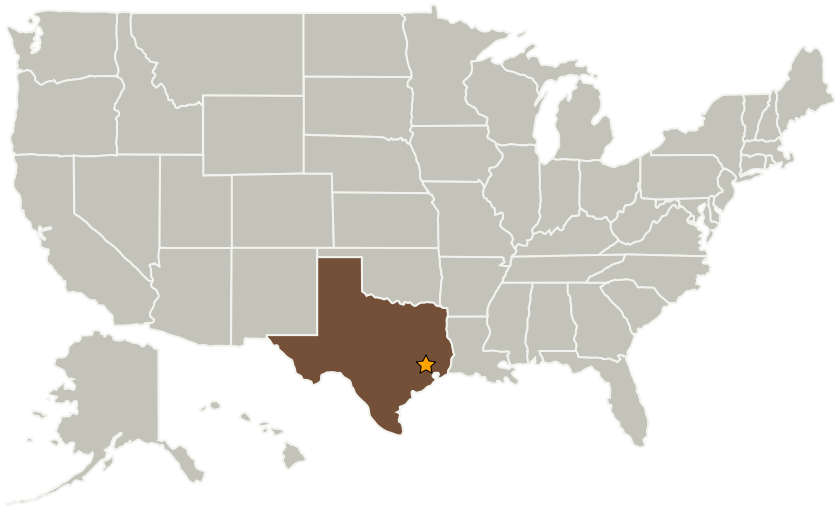
LandingNav: Terrain Guided Automated Precision Landing, Phase I

Completed Technology Project (2005 - 2005)

Project Introduction

The purpose of the proposed effort is to provide a novel and innovative precision landing sensor (LandingNav) for Mars. LandingNav supports space exploration by significantly enhancing real-time landmark recognition and navigation capabilities, thus substantially improving the Mars landing accuracy. The LandingNav system integrates two novel technologies. The first is a unique feature detection method based on edge detection and the Hough transform coupled with motion stereo and stereo correlation. The second is a novel multi-resolution learning algorithm for highly efficient terrain mapping. Together these innovations enable high-fidelity system-level landmark navigation solutions for the precision landing problem. This technology has a broad operational range and can be used for high-altitude navigation as well as terminal navigation (i.e., landing hazards avoidance). This proposal focuses on demonstrating, through analysis, simulation, and design, the applicability and feasibility of this particular terrain navigation technology for space exploration. Successful completion of the proposed Phase I effort will permit a Phase II effort to produce a functional prototype to demonstrate the increased landing precision and feature detection performance.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
StarVision Technologies, Inc.	Supporting Organization	Industry	College Station, Texas

Primary U.S. Work Locations
Texas

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

William H Gerstenmaier

Principal Investigators:

Jaiwon Shin
James Ochoa

Technology Areas

Primary:

- TX04 Robotic Systems
  - TX04.1 Sensing and Perception
    - TX04.1.2 State Estimation